The U.S. Advanced Battery Consortium

Automakers and DOE have teamed up to establish American leadership in new automotive technology

ENERGY EFFICIENCY AND RENEWABLE ENERGY

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FOR THE 21ST CENTURY

The environmental benefits of zero-emitting electric vehicles (EVs) are substantial, but the lack of a battery capable of providing the range and performance that would be acceptable to the consumer has proven to be a drawback in their development. American, Japanese and European companies and consortia are actively working to produce advanced batteries that can help make EVs practical for everyday use.

In 1991, the Big Three teamed up with the Department of Energy (DOE) to lead the way

The level of effort required to explore all of the promising battery technologies is expensive and time consuming. It is impractical for a single company to maintain the required level of research and development (R&D) activity while still meeting its responsibilities to its customers. In 1991, DaimlerChrysler, Ford Motor Company, and General Motors—the Big Three American automakers—entered into an agreement to pool their technical knowledge and funding, looking to accelerate progress by collectively combining expertise and reducing individual risk. Their partnership is called the United States Advanced Battery Consortium, or USABC.

The U.S. Department of Energy's Office of Transportation Technologies (OTT), which has long had extensive battery-related R&D activities underway, signed a cooperative agreement with the consortium, and agreed to provide technical expertise and funding. OTT also acts in an advisory and oversight capacity for various USABC committees and working groups.

An initial cooperative agreement between the Big Three and DOE covered the period from 1991 to 1996. About $190 million, cost-shared equally between government and industry was spent. In 1996, a Phase II cooperative agreement worth $106 million was signed, supporting work through the year 2000. In March 2000, a Phase III agreement was signed covering work through 2003.

The focus is on batteries

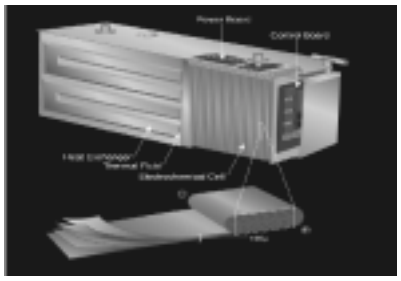
The key to making EVs practical is the development of batteries that can provide performance comparable with conventional vehicles, and at comparable cost. Electric vehicles with lead-acid batteries have limited range, allowing drivers to travel only relatively short distances before they must recharge. Lead-acid batteries with a specific energy (energy-to-weight ratio) of 30-40 watt-hours per kilogram (Wh/kg), at a cost of up to $150 per kilowatt hour, are not adequate for competitive electric vehicles.

The targets for advanced battery performance are a specific energy of 150 Wh/kg at a cost of $150 per kilowatt hour. Other goals include power-to-weight ratios of 300 watts per kilogram and a ten-year useful life. The nickel-metal hydride battery is currently the technology that has come closest to achieving these objectives, and although U.S. and major Japanese automakers are now offering this battery in their electric vehicles, this technology still falls short of the USABC's performance and cost targets. Lithium-based batteries appear to offer the best chance for meeting those targets. The consortium is therefore investigating lithium-ion and lithium-polymer battery technologies with the goal of producing zero-emission EVs that will be competitive with conventional gasoline-powered automobiles.

Diverse projects underway

The USABC has awarded a number of research contracts to outside groups for work on specific battery technologies. Where foreign-owned companies are involved, at least 50% of the batteries produced for the U.S. auto industry must be manufactured within the United States.

High Power Lithium Ion 47V Battery Module



Lithium Polymer Battery Module Design

USABC also can sponsor technical projects at DOE National Laboratories, by way of Cooperative Research and Development Agreements (CRADAs).

A model for intercompany and government/ industry partnerships

USABC is actually only one of many partnerships among the otherwise competitive American automakers. In 1996, DaimlerChrysler, Ford Motor Company and General Motors joined forces to create the U.S. Council for Automotive Research (USCAR) in order to tackle many crucial automotive technology challenges and help boost the competitiveness of American industry. USABC is one of the largest ventures under the USCAR agreement.

In addition, the automakers and OTT have, through USABC, developed and pioneered many new procedures that could maximize the success of government/industry cooperation. These new procedures could lead the way toward additional partnerships in the future.

For more information on how DOE is helping America remain competitive in the 21st century, please contact:

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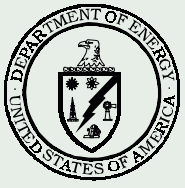

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